



PIN INSERTION



PININSERT

2100 – small & medium quantities
2200 – high-volume production
2500 – cutting, bending & insertion



PIN INSERTION TECHNOLOGY

PIN INTERCONNECTION - FROM PCB TO COILS

Pin insertion technology is a method of electronic assembly interconnection applicable to PCBs, coil frames, plastic connectors, etc. In contrast to complete connectors this solution is cost-efficient and customizable. Various pin press shapes and dimensions allow to adapt precisely to the product. EN 60352-5 qualification and automotive norms compliance assures high quality of a connection.

Pin interconnections advantages



Compatibility with holes of different diameters

Various pin press shapes allow large tolerances of hole diameter, which makes possible to select insertion and retention forces according to Customer's demand.



Qualification (Pressfit)

Pressfit pins 0.50×0.40 mm, 0.60×1.00 mm, 0.60×0.60 mm are qualified in accordance to EN 60352-5. It proved to have required contact resistance ($< 0.5 \text{ m}\Omega$), acceptable deformations and resistance to rapid temperature changes and climate sequences.



Cost-efficient

Instead of buying expensive connector, Customer can design the plastic connector and buy only pins that will fit Customer's components.



Automotive norms

Pin tip dimensions matches norms of such automotive manufacturers as BMW, GM, Daimler-Benz, PSA, VW, etc. Norms consider tip angle, rounding diameter, width and height of a pin tip.



Adaptability

Pin connection is produced on demand and adjustable in height and position, it can be inserted in necessary quantity into various components: PCB, plastic or metal connectors, coil frame, etc.



Low insertion force

Low insertion force simplifies the assembly and reduces the impact on PCB & components.



Deformation and vibrations resistance (Pressfit)

Pin insertion doesn't require additional soldering which means no thermal stress and no damage for components. As a result connection stays reliable under vibrations.



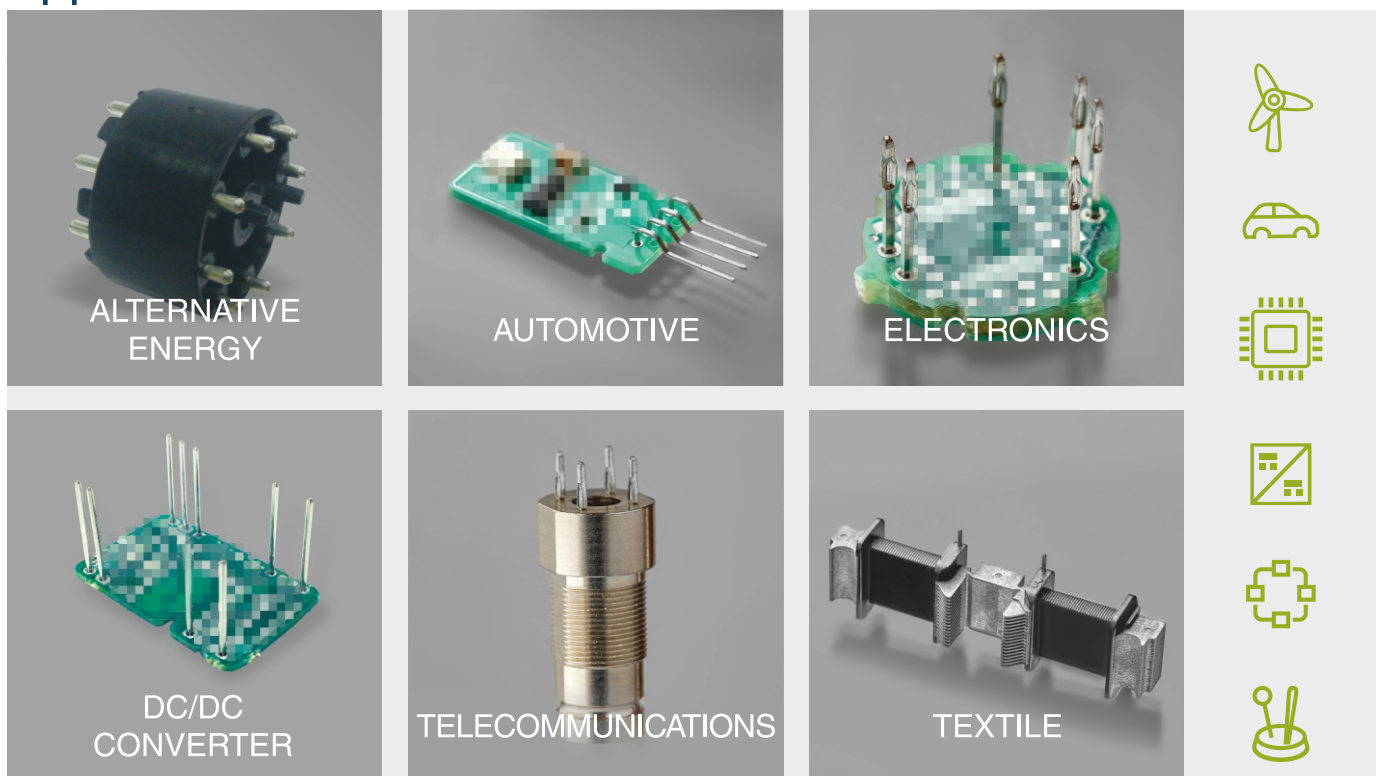
Easy to go

Thanks to automation it's possible to insert up to 15000 pins per hour without any experience in pin interconnections.

Component types



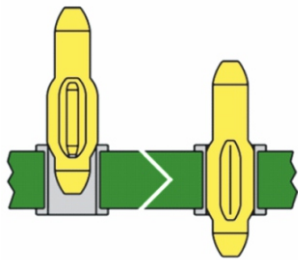
Application fields



Interconnections research

SM Contact designs and produces pin insertion machines for a wide range of electrical components: customized connector, PCB, coil frame, transformer, lead frame, etc.

We start each project with a pin design matching the application, selection of its material and coating to adapt machine specification to customer's product and to match industry norms.



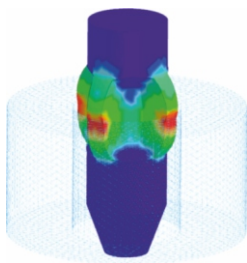
TOOLING DEFINITION

We do:

Define the tooling based on corresponding request with a help of database of former realized connections.

You get:

Equipment type, special tool necessity definition.



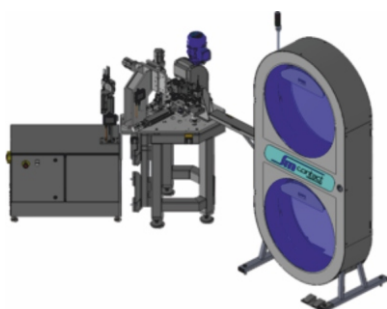
LABORATORY TESTS

We do:

Make samples and perform laboratory study: press-in and pull-out force, contact resistance test.

You get:

Report with precise connection parameters matching norms and Customer's requirements.



01
STEP

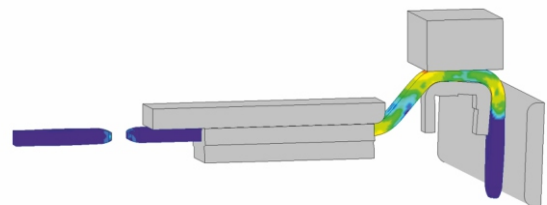
PIN PARAMETERS DEFINITION

We do:

Define pin features depending on type of application, connector/ component materials, working environment and temperature range.

You get:

Pin material (bronze, brass, CuFe2p, CuMg0.1, CuNi3SiMg, CuNiSi, Staku30), coating material (Ni-based 1.3-3 μ : Ag, Au, Sn), shape (square, round, rectangular), type (smooth, star, winged, harpoon, pressfit, double), length (2-70 mm).



02
STEP

PIN INSERTION SIMULATION

We do:

With a help of FEA software we build components computer model of defined type and materials and simulate strains and stresses during pin insertion.

You get:

Optimal insertion parameters and its improvement options are specified to match industry norms and Customer's demand.



04
STEP

EQUIPMENT MANUFACTURING

We do:

Adapt automation level, speed, special options and quality control devices.

You get:

Pin insertion equipment customized for Customer's application, as well as for quality, automation, cost and production volume requirements.

05
STEP



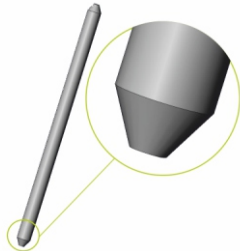
PIN INSERTION

PIN INSERTION TECHNOLOGY

PIN TYPES

Application

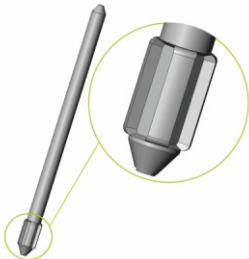
Smooth



Coil frame, printed circuits without metalized holes, overmolding, plastic components with drilled holes, metal components whose holes diameter has small tolerances

- Chamfers on both ends make it suitable for various connections

Star



Single- or double-sided PCBs

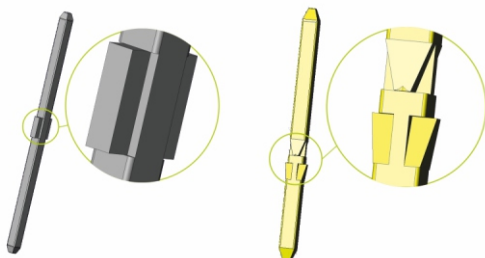
- Excellent mechanical resistance
- Holes diameter tolerances compensation
- Suitable for "paste-in-pin / pin-in-paste and reflow"

Plastic connectors

- Smooth tip of a pin enters freely without any damage
- 4 peaks of a star provide secure retention

Coil frames

Wings-Harpoon



Plastic connectors

- Smooth tip of a pin enters freely without any damage
- 2 peaks guarantee excellent mechanical resistance
- Meets the requirements of automotive manufacturers

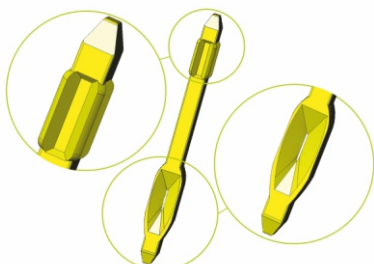
Pressfit



Double-sided PCBs

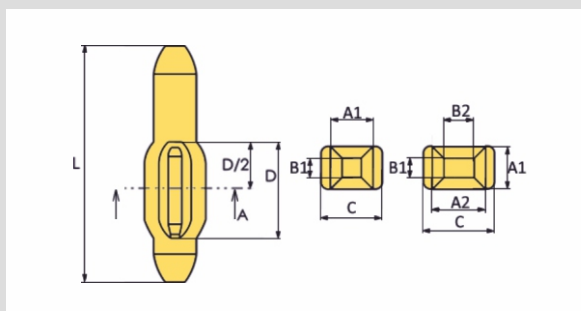
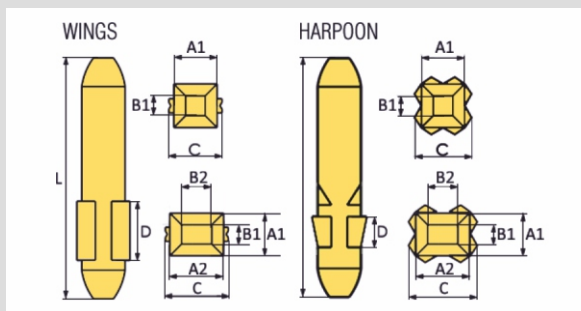
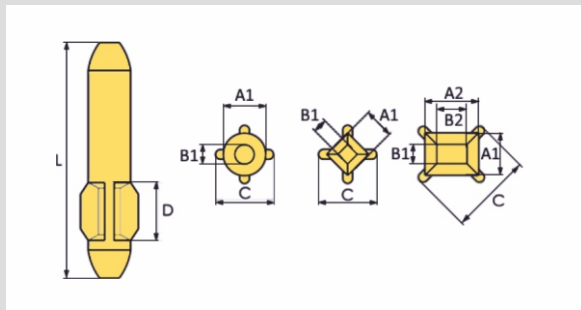
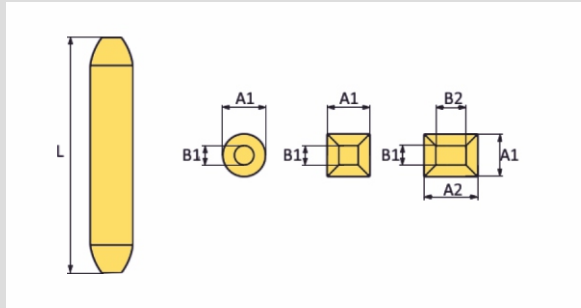
- Particularly for automotive industry
- Matches components with hole diameter tolerances $+0.10/-0$ mm
- Compliance with IEC 352.5 standard
- Size difference between hole and pressfit zone leads to pressfit deformation and sufficient compression during insertion

Combinations



Stacking of PCBs, stacking of PCBs with a plastic part

- One pin can have several press shapes for direct interconnection of two elements.
- Pin length, shape and type are defined individually for each connection



Smooth

WIRE SHAPE	Square				Round		Square		Round		Square
A1	0.3	0.4	0.46	0.5	0.5	0.63	0.71	0.91	1	1	1.14
A2	-	-	-	-	-	-	-	-	-	-	-
C	-	-	-	-	-	-	-	-	-	-	-
D	-	-	-	-	-	-	-	-	-	-	-
B1	0.2	0.25	0.25	0.25	0.3	0.3	0.35	0.45	0.55	0.4	0.6
B2	-	-	-	-	-	-	-	-	-	-	-

Star

WIRE SHAPE	Square								Round		Square	
A1	0.3	0.3	0.4	0.4	0.46	0.46	0.5	0.5	0.5	0.5	0.63	0.63
A2	-	-	-	-	-	-	-	-	-	-	-	-
C	0.5	0.55*	0.63	0.7*	0.73	0.8*	0.78	0.84*	0.66	0.7*	0.97	1.07*
D	1.1	1.1	1.1	1.1	1.5	1.5	1.5	1.5	0.8	0.8	1.5	1.5
B1	0.2	0.2	0.25	0.25	0.25	0.25	0.25	0.25	0.3	0.3	0.3	0.3
B2	-	-	-	-	-	-	-	-	-	-	-	-

WIRE SHAPE	Rect.	Square						Round		Square	
A1	0.63	0.71	0.71	0.91	0.91	1	1	1	1	1.14	1.14
A2	1	-	-	-	-	-	-	-	-	-	-
C	1.27	1.17	1.24*	1.5	1.55*	1.73	1.8*	1.32	1.4*	1.93	2*
D	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
B1	0.3	0.35	0.35	0.55	0.55	0.55	0.55	0.4	0.4	0.6	0.6
B2	0.5	-	-	-	-	-	-	-	-	-	-

WIRE SHAPE	Round		
A1	1.5	1.5	1.5
A2	-	-	-
C	1.78	1.78	1.78
D	1.5	1.5	1.5
B1	0.7	0.8	0.9
B2	-	-	-

* Reinforced star

Wings – Harpoon

WIRE SHAPE	Square		WIRE SHAPE	Square
A1	0.63	0.63	A1	0.63
A2	-	-	A2	-
C	0.93	0.84	C	0.85
D	1	1	D	0.65
B1	0.3	0.3	B1	0.3
B2	-	-	B2	-

PressFit

WIRE SHAPE	Rect.	Rect.	Square						Rect.
A1	0.4	0.6	0.63	0.63	0.63	0.63	0.63	0.63	0.63
A2	0.5	1	-	-	-	-	-	-	0.8
C	0.7	1.34	1.12	1.12	1.12	1.12	1.12	1.1	1.15
D**	1.8	3	1.8	1.8	2.66	2.66	3	3	3
B1	0.2	0.27	0.25	0.3	0.25	0.3	0.25	0.3	0.24
B2	0.25	0.5	-	-	-	-	-	-	0.45

**D=1.8 - pressfit short D=2.66 - pressfit medium D=3 - pressfit long

Materials & Coating

- Bronze (CuSn0,3, CuSn4, CuSn5, CuSn6, CuSn8)
- Brass (CuZn15, CuZn30, CuZn33, CuZn36, CuZn37)
- CuFe2p
- CuMg0.1
- CuNi3Si1Mg
- CuNiSi
- Staku30

Various Ni-based coatings 1.3-3 µ:
Ag, Au, Sn.



PIN INSERTION

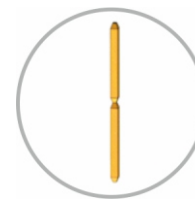
PIN INSERTION EQUIPMENT

PIN INSERTION EQUIPMENT

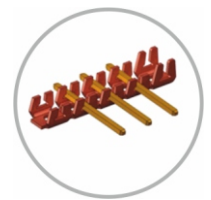
Depending on the configuration, equipment feeds in-bulk, end-to-end or bandolier pins, it performs pin insertion and bending, inline quality control, and defective products tracking. Pininsert series can be adapted for various pin press shapes and their combinations according to the application: smooth, star, winged or harpoon, Pressfit.



IN BULK



END-TO-END



BANDOILER

Choose one of SM Contact equipment configuration to manufacture stable, vibration resistant, compact connection matching the most widespread industry norms.

Advantages of pin insertion equipment



Universal

Equipment can be adapted to different overall production from small batch size to full-scale.



Qualification

Certification conformity: CE, TUV



Inline quality control

Laser, camera and force monitor tools allow control of such parameters as presence and position of components, insertion and bending force, etc.



Indexation system for end-to-end pins

The pin is indexed in the insertion head one step before cutting position, which decreases the tolerance of pin length and thus provides cutting and insertion precision.



Operating safety

Safety beams can be installed on the frame to detect foreign object presence and to stop the machine. This feature as well as work area lighting guarantees operator's safety.



Quick-change insertion tooling

Insertion head, pneumatic or servomotor, comprises of tool set, which could be changed to another one according to the application in less than 15 min by a trained worker.



Pins compatibility

Pininsert machines can process various pin types (straight and bent) regardless its supply form (in-bulk, end-to-end, bandolier).



User-friendly

Intuitive programming and easy-to-operate PC interface with standard PC keyboard & mouse.



Poka Yoke

Parts indicated by laser or insertion force sensor as defective are to be thrown into special container. Until these parts are detected inside of the container, the machine wouldn't continue operation.



CNC system

CNC system with brushless servomotors and Mitsubishi encoders.

Pininsert 2100

SEMI-AUTOMATIC PIN INSERTION INTO THE PCB

Technical characteristics

Power supply	220 V 50 Hz 10 A
Power	0.5 kW
Air pressure*	6 bar
Instantaneous cycle time	500 ms/pin
Max pin's length (standard version)	25 mm
Max pin's length (long version)	60 mm
Max pin's cross section	1.5 mm x 1.5 mm
Time of insertion head change	10 min
Time of set of part change into insertion head	15 min
Standard motorized X axis (option)	70 mm stroke
Standard motorized Y axis (option)	70 mm stroke
Weight (basic)	70 kg
Dimensions (WxDxH)	400 x 400 x 700 mm
CE conformity	✓

* Only for pneumatic insertion head or conveyor version

Pininsert 2100 is a pneumatic or servo-drive table-mount machine for semi-automatic pin insertion into various electrical components. It was designed as stand-alone or inline machine for small and medium production volumes (up to 3 600 pins per hour).

Components are located on the manually-adjustable working table. Operator moves it to the work zone where pins are inserted one at a time in automatic (option), step-by-step and manual operation modes. Table can be motorized on demand.

Interchangeable insertion head makes it possible to produce various applications on one machine.

Camera and laser control assures correct positioning of the components and pin.



Alignment supports
for plastic components



PIN INSERTION

PIN INSERTION EQUIPMENT

Pininsert 2200

HIGH-VOLUME SEMI-AUTOMATIC PIN INSERTION
INTO THE PCB OR PLASTIC PARTS

Technical characteristics


Power supply	220 V 50 Hz 10A
Power	2.0 kW
Air pressure*	6 bar
Instantaneous cycle time	500 ms/pin
Max pin's length (standard version)	25 mm
Max pin's length (long version)	60 mm
Max pin's cross section	1.5 mm x 1.5 mm
Time of insertion head change	10 min
Time of set of part change into insertion head	15 min
Standard motorized X axis (option)	400 mm stroke
Standard motorized Y axis (option)	400 mm stroke
Weight (basic)	500 kg
Dimensions (WxDxH)	1200x1200x1600 mm
CE conformity	✓

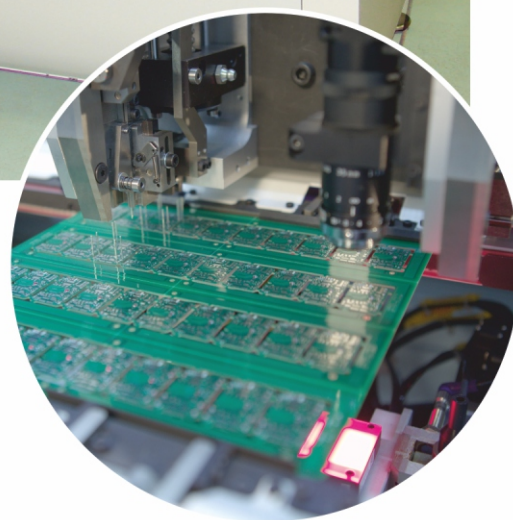
* Only for pneumatic insertion head or conveyor version

Pininsert 2200 is a CNC floor-mount machine for semi-automatic pin insertion. It was designed for high production volumes: up to 8 000 pins per hour with a single insertion head and up to 15 000 pins with a double head.

Supervised by PC and having fully programmable insertion height, Pininsert 2200 can be integrated into a production line or operated as a stand-alone unit.

Pininsert 2200 can be optionally equipped either with universal clamps for PCB or with Y table and adapting fixtures for plastic connectors.

 Double-head version is available for processing pins of different dimensions.



Universal table
for PCB plate

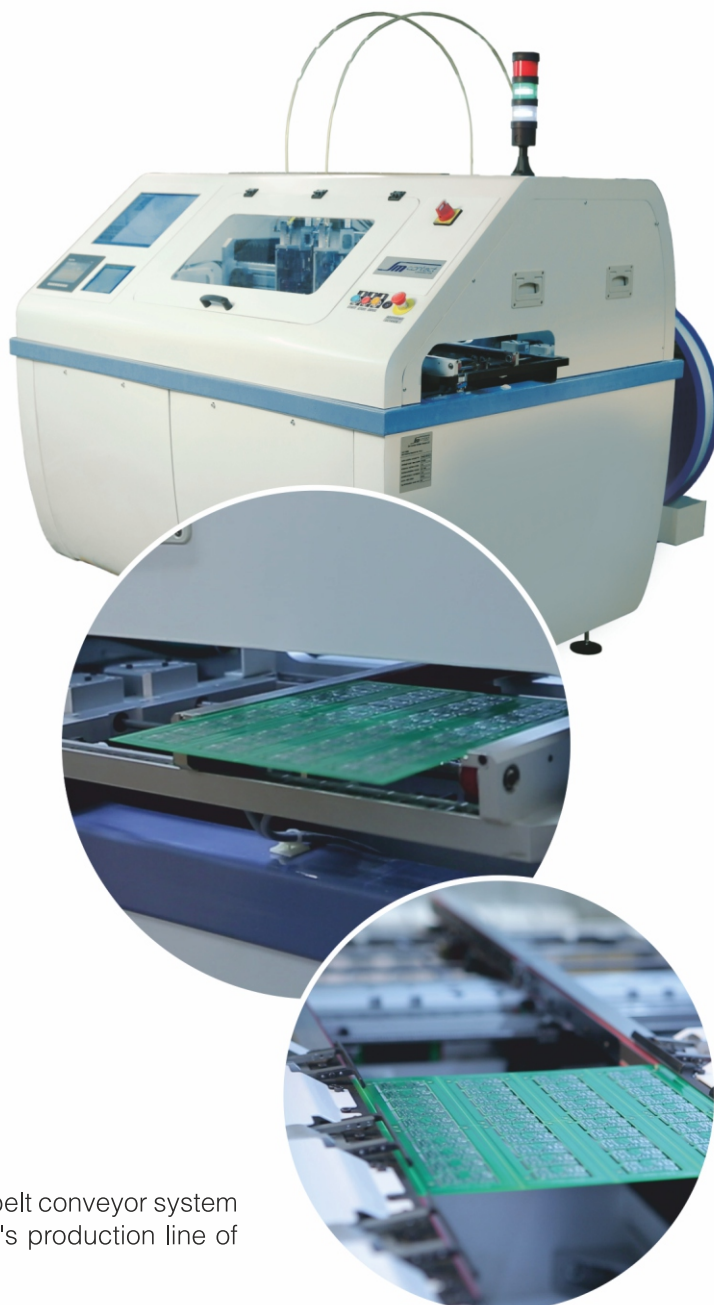
Pininsert 2200 CV

CONVEYOR VERSION OF HIGH-VOLUME SEMI-AUTOMATIC
PIN INSERTION INTO THE PCB



Technical characteristics

Power supply	220 V 50 Hz 10 A
Power	3.0 kW
Air pressure	6 bar
Instantaneous cycle time	500 ms/pin
Max pin's length (standard version)	25 mm
Max pin's length (long version)	60 mm
Max pin's cross section	1.5 mm x 1.5 mm
PCB dimensions	Min. 50 x 50 mm Max. 400 x 400 mm
Time of insertion head change	10 min
Time of set of part change into insertion head	15 min
Standard motorized X axis (option)	400 mm stroke
Standard motorized Y axis (option)	400 mm stroke
Weight (basic)	1500 kg
Dimensions (WxDxH)	1860x1730x1670 mm
Conveyor height from the floor	350±30 mm
CE conformity	✓



Pininsert 2200 CV is equipped with SMEMA compatible belt conveyor system to enable the integration of equipment to the Customer's production line of surface-mounted printed circuit boards.

- ✓ Quick and safe transportation of the PCB with less labor expense;
- ✓ Conveyor adjustable in height and width;
- ✓ Integration into Customer's production line and traceability management system;
- ✓ Data matrix reader for automatic program change;



Double-head version is available for processing pins of different dimensions.

SMEMA compatible
belt conveyor



PIN INSERTION

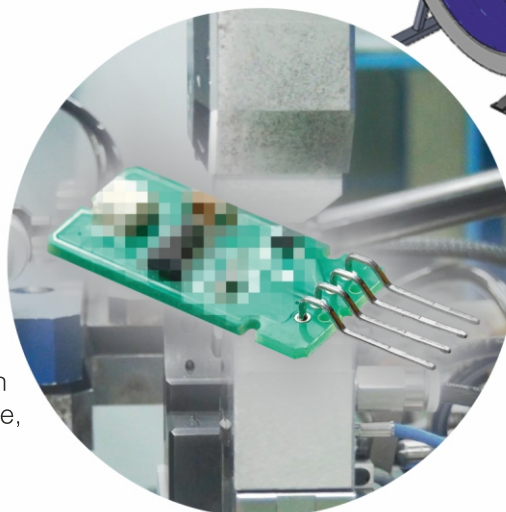
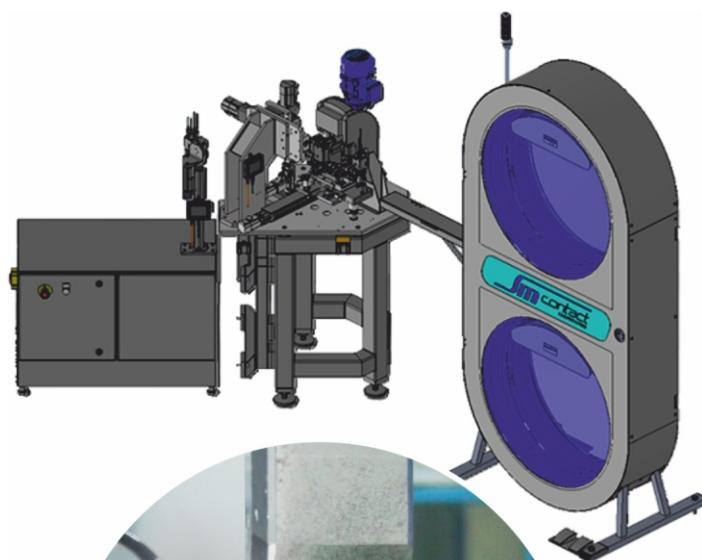
PIN INSERTION EQUIPMENT

Pininsert 2500

CUTTING, BENDING & SIMULTANEOUS INSERTION UP TO 10 PINS INTO THE PCB OR PLASTIC PARTS

Technical characteristics

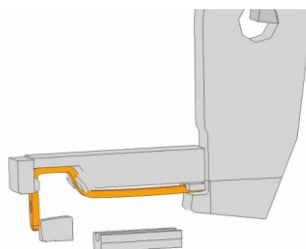
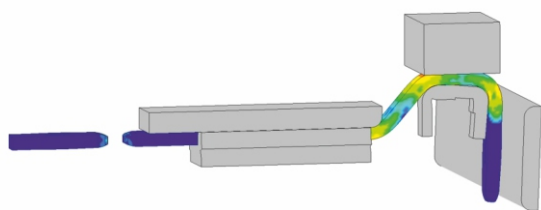
Power supply	220 V 50 Hz 10A
Power	3.0 kW
Instantaneous cycle time	3-4 sec for 4 bended pins/pin
Max pin's length (standard version)	25 mm
Max pin's cross section	1.5 mm x 1.5 mm
Weight (basic)	700 kg
Dimensions (WxDxH)	2000x1200x1700 mm
CE conformity	✓



Pininsert 2500 is a connectors assembly equipment for cutting, 3-angle bending & simultaneous insertion up to 10 pins into the PCB or plastic parts.

All the parameters of Pininsert 2500 processing were verified with the help of FEA simulation and tests: bending tooling shape, pin cutting principle, Y-axis acceleration while transfer, insertion force, etc.

Operation principles:



1 Single pins are separated from wire

2 Pins are bent

3 Pins are transferred to insertion zone

4 Pins are inserted into PCB or plastic connector

Specification summary

Features

	PININSERT 2100	PININSERT 2200	PININSERT 2500
Pins unreeling & feeding systems	+	+	+
Insertion head & tooling	+	+	+
Easy-to-operate PC interface with standard PC keyboard & mouse	-	+	-
4 pin line bending systems	-	-	+
Up to 4 pin line unreeling & feeding systems	-	-	+
Conveyor version	-	+	-

Options

Frame & cabinet	+	-	-
Automatic components loading/unloading	-	+	-
Vibrating feeder for connectors	+	-	-
Motorized table (X/XY axis)	+	-	-
Y table for plastic connectors	-	+	-
Universal table for PCB	-	+	-
Alignment supports for components	+	+	-
Additional 2 pin line systems	-	-	+
Up to 4 pin line selector	-	-	+
Poka Yoke	+	+	-
Lighting & safety beams	+	+	-
Pin presence laser control	+	+	-
Components position laser control	+	+	-
Cameras for feeding & insertion unit	-	-	+
Insertion camera control	-	+	-
Insertion height camera control	+	+	-
Insertion force control	+	+	+
Bending force control	-	-	+
Force data export to Excel	+	+	-
Barcode reader	+	+	-
TUV certificate & CE conformity	+	+	+
Double insertion head	-	+	-



PIN INSERTION

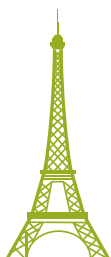
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SPAIN

Watch Pininsert video



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